

-20-

CLAIMS

What is claimed is:

1 1. A method for encoding a video stream to generate an encoded video bitstream, comprising the
2 steps of:

3 (a) encoding, into the encoded video bitstream, a first original frame/region in the video stream using
4 intra-frame coding to generate an encoded first frame/region; and

5 (b) encoding, into the encoded video bitstream, a second original frame/region in the video stream
6 using motion-based predictive coding, wherein at least some motion information used during the motion-
7 based predictive coding is excluded from the encoded video bitstream.

1 2. The invention of claim 1, wherein all of the motion information used during the motion-based
2 predictive coding is excluded from the encoded video bitstream and the encoded video bitstream does not
3 explicitly include any motion information.

1 3. The invention of claim 1, wherein step (b) comprises the steps of:

2 (1) decoding the encoded first frame/region to generate a decoded first frame/region;

3 (2) encoding the second original frame/region to generate an encoded second frame/region;

4 (3) decoding the encoded second frame/region to generate a decoded second frame/region;

5 (4) performing motion computation between the decoded second frame/region and the decoded first
6 frame/region to generate the motion information;

7 (5) applying the motion information to the decoded first frame/region to generate a synthesized second
8 frame/region;

9 (6) performing inter-frame differencing between the synthesized second frame/region and the second
10 original frame/region to generate residual errors; and

11 (7) encoding, into the encoded video bitstream, at least some of the residual errors.

1 4. The invention of claim 1, further comprising the step of:

2 (c) encoding, into the encoded video bitstream, a third original frame/region in the video stream using
3 tweening based on the motion information used to encode the second original frame/region.

1 5. A video encoder for encoding a video stream to generate an encoded video bitstream, comprising:

2 (a) a frame/region type selector configured for selecting different processing paths for encoding
3 different frames/regions into the encoded video bitstream;

4 (b) a first processing path configured for encoding, into the encoded video bitstream, a first original
5 frame/region in the video stream using intra-frame coding to generate an encoded first frame/region; and

-21-

6 (c) a second processing path configured for encoding, into the encoded video bitstream, a second
7 original frame/region in the video stream using motion-based predictive coding, wherein the video encoder
8 has an encoding mode in which at least some motion information used during the motion-based predictive
9 coding is excluded from the encoded video bitstream.

1 6. The invention of claim 5, wherein the video encoder is a scaleable video encoder that can be
2 operated at a plurality of different encoding modes, wherein:

3 in a first encoding mode, all of the motion information is excluded from the encoded video bitstream
4 and the encoded video bitstream does not explicitly include any motion information; and

5 in a second encoding mode, at least some of the motion information is encoded into the encoded video
6 bitstream.

1 7. The invention of claim 6, wherein:

2 in the second encoding mode, a first portion of the motion information is encoded into the encoded
3 video bitstream and a second portion of the motion information is excluded from the encoded video
4 bitstream; and

5 in a third encoding mode, all of the motion information is encoded into the encoded video bitstream.

1 8. The invention of claim 5, wherein:

2 the first processing path is configured for decoding the encoded first frame/region to generate a
3 decoded first frame/region; and

4 the second processing path is configured for:

5 (1) encoding the second original frame/region to generate an encoded second frame/region;

6 (2) decoding the encoded second frame/region to generate a decoded second frame/region;

7 (3) performing motion computation between the decoded second frame/region and the decoded
8 first frame/region to generate the motion information;

9 (4) applying the motion information to the decoded first frame/region to generate a synthesized
10 second frame/region;

11 (5) performing inter-frame differencing between the synthesized second frame/region and the
12 second original frame/region to generate residual errors; and

13 (6) encoding, into the encoded video bitstream, at least some of the residual errors.

1 9. The invention of claim 8, wherein the encoding in the first processing path and the encoding of the
2 second original frame/region in the second processing path are based on intra-frame wavelet encoding.

1 10. The invention of claim 8, wherein:

-22-

the first processing path is configured for intra-frame coding the first original frame/region at a high resolution;

the decoded first frame/region is at the high resolution;

the second processing path is configured for:

(i) spatially sub-sampling the second original image/region to generate a low-resolution second frame/region having a resolution lower than the high resolution; and

(ii) intra-frame coding the low-resolution second frame/region to generate the encoded second frame/region;

the decoded second frame/region is at the low resolution; and

the synthesized second frame/region is at the high resolution.

11. The invention of claim 8, wherein the second processing path is configured for:

(i) thresholding the residual errors to generate binary data; and

(ii) encoding, into the encoded video bitstream, the at least some of the residual errors based on the binary data.

12. The invention of claim 5, further comprising a third processing path configured for encoding, into the encoded video bitstream, a third original frame/region in the video stream using tweening based on the motion information used to encode the second original frame/region.

13. The invention of claim 12, wherein:

the first processing path is configured for decoding the encoded first frame/region to generate a decoded first frame/region; and

the third processing path is configured for:

(1) temporally interpolating the motion information used to encode the second original frame/region;

(2) applying the temporally interpolated motion information to the decoded first frame/region to generate a synthesized third frame/region;

(3) generating residual errors between the synthesized third frame/region and the third original frame/region; and

(4) encoding, into the encoded video bitstream, at least some of the residual errors.

14. The invention of claim 13, wherein:

the first processing path is configured for intra-frame coding the first original frame/region at a high resolution;

the decoded first frame/region is at the high resolution;

-23-

5 the synthesized third frame/region is at the high resolution; and
6 the third processing path is configured for performing inter-frame differencing between the synthesized
7 third frame/region and the third original frame/region to generate the residual errors.

1 15. A method for decoding an encoded video bitstream to generate a decoded video stream,
2 comprising the steps of:

3 (a) decoding, from the encoded video bitstream, an encoded first frame/region using intra-frame
4 decoding to generate a decoded first frame/region; and

5 (b) decoding, from the encoded video bitstream, an encoded second frame/region using motion-based
6 predictive decoding, wherein at least some motion information used during the motion-based predictive
7 decoding is generated by performing motion computation as part of the decoding method.

1 16. The invention of claim 15, wherein the encoded video bitstream does not explicitly include any
2 motion information and all of the motion information used during the motion-based predictive decoding is
3 generated as part of the method.

1 17. The invention of claim 15, wherein step (b) comprises the steps of:

2 (1) decoding, from the encoded video bitstream, the encoded second frame/region to generate a
3 decoded second frame/region;

4 (2) performing the motion computation between the decoded second frame/region and the decoded
5 first frame/region to generate the motion information;

6 (3) applying the motion information to the decoded first frame/region to generate a synthesized second
7 frame/region;

8 (4) decoding, from the encoded video bitstream, encoded residual errors to generate decoded residual
9 errors corresponding to the synthesized second frame/region; and

10 (5) performing inter-frame addition between the decoded residual errors and the synthesized second
11 frame/region to generate an error-corrected decoded second frame/region.

1 18. The invention of claim 15, further comprising the step of:

2 (c) generating a decoded third frame/region using tweening based on the motion information used to
3 decode the encoded second frame/region.

1 19. The invention of claim 15, further comprising the step of de-interlacing a decoded second
2 frame/region generated during step (b) to generate two corresponding fields corresponding to the decoded
3 second frame/region.

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-24-

1 20. A video decoder for decoding an encoded video bitstream to generate a decoded video stream,
2 comprising:

3 (a) a frame/region type selector configured for selecting different processing paths for decoding
4 different encoded frames/regions from the encoded video bitstream;

5 (b) a first processing path configured for decoding, from the encoded video bitstream, an encoded first
6 frame/region in the video stream using intra-frame decoding to generate a decoded first frame/region; and

7 (c) a second processing path configured for decoding, from the encoded video bitstream, an encoded
8 second frame/region in the video stream using motion-based predictive decoding, wherein the video
9 decoder has a decoding mode in which at least some motion information used during the motion-based
10 predictive decoding is generated by the video decoder performing motion computation.

1 21. The invention of claim 20, wherein the video decoder is a scaleable video decoder that can be
2 operated at a plurality of different decoding modes, wherein:

3 in a first decoding mode, the encoded video bitstream does not explicitly include any motion
4 information and all of the motion information is generated by performing the motion computation by the
5 video decoder; and

6 in a second decoding mode, at least some of the motion information is decoded from the encoded video
7 bitstream.

1 22. The invention of claim 21, wherein:

2 in the second decoding mode, a first portion of the motion information is decoded from the encoded
3 video bitstream and a second portion of the motion information is generated by performing the motion
4 computation by the video decoder; and

5 in a third decoding mode, all of the motion information is decoded from the encoded video bitstream.

1 23. The invention of claim 20, wherein:

2 the second processing path is configured for:

3 (1) decoding, from the encoded video bitstream, the encoded second frame/region to generate a
4 decoded second frame/region;

5 (2) performing the motion computation between the decoded second frame/region and the decoded
6 first frame/region to generate the motion information;

7 (3) applying the motion information to the decoded first frame/region to generate a synthesized
8 second frame/region;

9 (4) decoding, from the encoded video bitstream, encoded residual errors to generate decoded
10 residual errors corresponding to the synthesized second frame/region; and

-25-

11 (5) performing inter-frame addition between the decoded residual errors and the synthesized
12 second frame/region to generate an error-corrected decoded second frame/region.

1 24. The invention of claim 23, wherein the decoding in the first processing path and the decoding of
2 the second encoded frame/region in the second processing path are based on intra-frame wavelet decoding.

1 25. The invention of claim 23, wherein:
2 the decoded first frame/region is at a high resolution;
3 the decoded second frame/region is at a low resolution lower than the high resolution;
4 the synthesized second frame/region is at the high resolution; and
5 the error-corrected decoded second frame/region is at the high resolution.

1 26. The invention of claim 20, further comprising a third processing path configured for generating a
2 decoded third frame/region using tweening based on the motion information used to decode the encoded
3 second frame/region.

1 27. The invention of claim 26, wherein the third processing path is configured for:
2 (1) temporally interpolating the motion information used to decode the encoded second frame/region;
3 and
4 (2) applying the temporally interpolated motion information to the decoded first frame/region to
5 generate the decoded third frame/region.

1 28. The invention of claim 27, wherein the decoded third frame/region is not explicitly represented in
2 the encoded video bitstream.

1 29. The invention of claim 27, wherein the third processing path is configured for:
2 (i) applying the temporally interpolated motion information to the decoded first frame/region to
3 generate a synthesized third frame/region;
4 (ii) decoding, from the encoded video bitstream, encoded residual errors for an encoded third
5 frame/region to generate decoded residual errors; and
6 (iii) applying the decoded residual errors to the synthesized third frame/region to generate the decoded
7 third frame/region.

1 30. The invention of claim 29, wherein:
2 the decoded first frame/region is at a high resolution;
3 the synthesized third frame/region is at the high resolution; and

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-26-

4 the third processing path is configured for performing inter-frame addition between the synthesized
5 third frame/region and the decoded residual errors to generate the decoded third frame/region at the high
6 resolution.

1 31. The invention of claim 20, wherein the second processing path is configured for de-interlacing a
2 decoded second frame/region to generate two corresponding fields corresponding to the decoded second
3 frame/region.

1 32. A method for decoding an encoded video bitstream to generate a decoded video stream,
2 comprising the steps of:

3 (a) decoding, from the encoded video bitstream, a plurality of encoded frames/regions to generate a
4 plurality of decoded frames/regions using motion information; and

5 (b) performing tweening based on the motion information to insert one or more additional
6 frames/regions into the decoded video stream.

1 33. The invention of claim 32, wherein the one or more additional frames/regions are not explicitly
2 encoded in the encoded video bitstream.

1 34. A decoder for decoding an encoded video bitstream to generate a decoded video stream,
2 comprising:

3 (a) one or more processing paths configured for decoding, from the encoded video bitstream, a
4 plurality of encoded frames/regions to generate a plurality of decoded frames/regions using motion
5 information; and

6 (b) an additional processing path configured for performing tweening based on the motion information
7 to insert one or more additional frames/regions into the decoded video stream.

1 35. The invention of claim 34, wherein the one or more additional frames/regions are not explicitly
2 encoded in the encoded video bitstream.

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